

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 24 AUG 2005

PCT


Applicant's or agent's file reference 96 770 a/se	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/07778	International filing date (day/month/year) 17.07.2003	Priority date (day/month/year) 17.07.2003
International Patent Classification (IPC) or both national classification and IPC H04M11/00		
Applicant ENEL DISTRIBUZIONE S.P.A. et al.		

1. This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 15.02.2005	Date of completion of this report 23.08.2005
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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP 03/07778**

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, Pages

1-25 as originally filed

Claims, Numbers

1-21 received on 14.06.2005 with letter of 14.06.2005

Drawings, Sheets

1/9-9/9 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-21
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-21
Industrial applicability (IA)	Yes: Claims	1-21
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

- 1) The following documents (D) are referred to in this communication:

D1=US-A-5 892 758

D2=WO-A-01 74045

- 2) With regard to present **claim 1** the document D1 discloses a method of remote metering the consumption of utilities (column 1, line 18-20) distributed through a public distribution network (column 1, line 18-25) each consumer being associated with at least one remote meter (fig. 3), wherein each of the plurality of remote meters measures a consumption and reports the measured consumption to a concentrator associated with said plurality of meters (column 1, line 32-34), said concentrator communicates with said plurality of remote meters in order to collect the consumption data (column 1, line 32-34) and perform tasks related to the administration of its associated remote meters (column 1, line 34-36), each of said remote meters having a host controller and a program memory, said host controller executing programs stored in said program memory (column 10, line 41-54), wherein said concentrator performs the operation of transmitting program data to at least one of said remote meters (column 10, line 51-54), wherein at least one of said remote meters performs the operation of receiving said program data (column 10, line 51-54), and updating at least a portion of said programs stored in said program memory in accordance with the received program data (column 10, line 51-54).

Claim 1 also contains the feature that "said operation of transmitting said program data comprises successively transmitting program data messages each comprising a portion of said program data" even if this is not explicitly mentioned in D1 this step is performed in any packet switched network as soon as the volume of the information to be transferred is bigger than the packet size of that particular system. This feature does therefore not give any contribution to an inventive step.

Furthermore, even if program data (in the sense of software updates) is not explicitly mentioned in D1 it is considered to be implicitly mentioned in the above cited passages. Even if this would not be the case, the problem to be solved would then be how to transfer program updates to the remote meters.

It is however known from D2 to send software updates to remote meters (page 6, line 31-page 7, 5). To combine the teachings of D2 with the method of D1 (especially since at least control data and parameter updates are sent to the meters in D1) and arrive at the method of claim 1 has therefore to be considered as obvious to the man skilled in the art.

Therefore claim 1 does not fulfill the requirements of Article 33(3) PCT since its subject matter does not involve an inventive step.

- 3) The only additional subject matter of independent **claim 20** (in comparison with claim 1), is the use of a micro controller to process data. The use of micro controllers is however extremely well known in the art and do not give any contribution to an inventive step, as compared to claim 1.

Hence claim 20 does not fulfill the requirements of Article 33(3) PCT since its subject matter does not involve an inventive step.

- 4) The subject matter of independent **claim 21** is only comprised of parts of the subject matter of claim 1, therefore the above deficiencies identified regarding claim 1 also hold for claim 21.

Hence claim 21 does not fulfill the requirements of Article 33(3) PCT since its subject matter does not involve an inventive step.

- 5) Regarding dependent **claims 2, 4 and 17-18** their additional subject matter is known from D1, claims 2 and 4 from column 10, lines 51-55, claim 17 from column 6, line 4-7 and claim 18 column 1, line 16-25. There is no additional subject matter of **claim 3**, since the mere naming of the transferred data as program update control message does not add anything to the subject matter of claim 1. Regarding **claim 19** all of its subject matter is part of claim 1 and therefore the deficiencies identified above regarding claim 1 also hold for claim 19.

Hence claims 2-4 and 17-19 do not fulfill the requirements of Article 33(3) PCT since their respective subject matter does not involve an inventive step.

- 6) Regarding claims 5-16 their additional subject matter is (the well known) results of purely implementational considerations. Claim 5 (the use of sequence numbers), claim 6 (File Transfer Protocol), claim 7 (request for acknowledgement and re-send upon failure), claim 8, (re-send until success), claim 9 (use of acknowledgement messages), claim 10 (request for acknowledgement), claim 11 (buffering of data), claim 12 (use of a non-volatile memory), claim 13 (error check before and after download of program data), claim 14 (the use of a boot strap) and, claims 15 and 16 (the use of flags to indicate status).

Hence claims 5-16 do not fulfill the requirements of Article 33(3) PCT since their subject matter does not involve an inventive step.

Further remarks

- 7) Independent claims 20 and 21 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with known features (see D1 and D2) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Claims 20 and 21 should therefore have been redrafted accordingly.

- 8) To meet the requirements of Rule 5.1(a)(ii) PCT, the documents D1 and D2 should have been identified in the description and the relevant background art disclosed therein should have been discussed.

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Claims

1. A method of remote metering the consumption of utilities distributed through a public distribution network (HV, MV, LV) to a plurality of consumers (H1, H2, ..., Hn), each consumer being associated with at least one remote meter (RM), wherein

- each of the plurality of remote meters (RM) measures a consumption and reports the measured consumption to a concentrator (C) associated with said plurality of remote meters (RM), and
- said concentrator (C) communicates with said plurality of remote meters (RM) in order to collect consumption data and perform tasks related to the administration of its associated remote meters;
- each of said remote meters (RM) having a host controller (MCM) and a program memory (PM1, PM2), said host controller (MCM) executing programs stored in said program memory (PM1, PM2),

characterized in that said concentrator (C) performs the operation of

- transmitting program data (SC5, SC8) to at least one of said remote meters (RM);

wherein at least one of said remote meters (RM) performs the operation of

- receiving said program data (SM4, SM11, SM13); and
- updating (SM19) at least a portion of said programs stored in said program memory (PM2) in accordance with the received program data;

wherein said operation of transmitting said program data comprises successively transmitting (SC5) program data messages each comprising a portion of said program data.

2. The method according to claim 1, wherein said operation performed by said concentrator of transmitting program data comprises the steps of
 - selecting (SC1) at least one individual meter (RM) or group of meters among said plurality of remote meters by transmitting at least one selection message addressed to said at least one individual meter or group of meters;
 - wherein each of said remote meters performs said operation of receiving said program data and updating said program memory subject to the condition that it has been selected by said concentrator.
3. The method according to any one of the preceding claims, wherein
 - said operation of transmitting program data comprises the step (SC2) of transmitting a program update control message; and
 - said operation of updating said program stored in said program memory in accordance with the received program data is performed in accordance with said received program update control message (SC2).
4. The method according to claim 3, wherein said program update control message comprises control information relating to the update time and/or a program digest and/or a download start command.

5. The method according to any one of the preceding claims, wherein each transmitted program data message contains a message identifier which distinguishes the message from other program data messages.

6. The method according to claim 5, wherein

- the concentrator transmits (SC5) to said at least one remote meter (RM) a message indicating a number N of program data messages;

wherein the operation of receiving said program data comprises the steps of

- checking (SM5) whether all the N program data messages have been received successfully; and
- if all the N program data messages have been received successfully, arranging (SM19) the program data content of said N messages in accordance with the respective identifiers n of each message and/or calculating a program digest from the received program data messages.

7. The method according to claim 5 or 6, wherein said concentrator

- successively queries (SC7) each of said at least one meters whether it has received all program data messages comprising different portions of said program data; and
- if a queried meter reports missing or incorrectly received program data messages, retransmits (S8) in broadcast mode the program data messages reported by the queried meter to be incorrect or missing;

- wherein each of said at least one meters receives (SM11 to SM15) those program data messages during said retransmission which the respective meter has missing or incorrectly received.
8. The method according to claim 7, comprising
- said concentrator repeating (SC9) said operation of successively querying each of said at least one meters until all of said at least one meters have reported the successful reception of all program data messages into which the program data are divided, or until an abort condition is satisfied.
9. The method according to claim 8, comprising
- if a meter has successfully received all of said program data messages, reporting (SM10) a download complete message to said concentrator;
 - said concentrator excluding (SC11) from said successive queries such meters from which a download complete message has been received.
10. The method according to claim 9, wherein said download complete message is reported in response to a said query by said concentrator.
11. The method according to any one of the preceding claims, wherein said step of receiving program data comprises storing (SM13) said program data in a buffer memory.
12. The method according to claim 11, wherein said buffer memory is a non volatile memory (PM3).

13. The method according to claim 11 or 12, wherein the operation of updating said program stored in said program memory comprises
- checking (SM6, SM7) whether the program data stored in said buffer memory are correct;
 - if the program data in said buffer memory are correct, copying (SM19) the program data stored in said buffer memory (PM3) into said program memory (PM2);
 - checking (SM20) whether the copied data in said program memory are correct; and
 - if the copied data are found to be not correct, repeating (SM19, SM20) the step of copying the program data stored in said buffer memory into said program memory.
14. The method according to any one of the claims 11 to 13, wherein said operation of updating at least a portion of said programs stored in said program memory (PM2) is performed by said host controller (MCM) executing a program data swap routine stored in a non volatile memory area (PM1) protected against any program data change.
15. The method according to claim 13 or 14, comprising
- setting (SM17) a flag prior to copying data from said buffer memory into said program memory (PM2); and
 - clearing (SM22) said flag if the copied data in said program memory (PM2) are found to be correct.

16. The method according to any one of the claims 13 to 15, wherein said host controller
- checks (SM23) said flag after a power failure; and
 - if said flag is found to be set, restarts (SM24) the operation of copying data from said buffer memory (PM3) into said program memory (PM2) and checking (SM25) the correctness of the copied data.
17. The method according to any one of the preceding claims, wherein said concentrator (C) communicates with said remote meters (RM) via power line communication.
18. The method according to any one of the preceding claims, wherein said utilities are electricity, water or gas.
19. A system for remote metering the consumption of utilities distributed through a public distribution network (HV, MV, LV) to a plurality of consumers (H1, H2, ..., Hn), the system comprising
- at least one concentrator (C) and a plurality of remote meters (RM) located inside or outside of customer premises,
 - said at least one concentrator (C) being adapted to communicate with said remote meters (RM) in order to collect consumption data and perform tasks related to the administration of its associated remote meters (RM);
 - each of said remote meters (RM) having a host controller (MCM) and a program memory (PM1, PM2) for executing programs stored in said program memory;

- said concentrator (C) and said remote meters (RM) being adapted to perform a method of remote metering in accordance with any one of the preceding claims.

20. A concentrator for collecting data regarding the consumption of utilities from a plurality of associated remote meters (RM) each having a host controller (MCM) and a program memory (PM1, PM2) for storing a program to be executed by said host controller (MCM) of the remote meter (RM), said concentrator (C) comprising

- a communication interface (CIC) for communicating with said plurality of remote meters (RM);
- a micro controller (MCC) for processing data received from said remote meters (RM) through said communication interface (CIC);
- said micro controller (MCC) being programmed to transmit program data to at least one of said associated remote meters (RM) for updating at least a portion (PM2) of said programs stored in the program memory (PM1, PM2) of said remote meter (RM);

wherein said concentrator is adapted to transmit said program data by successively transmitting program data messages each comprising a portion of said program data.

21. A remote meter for measuring the consumption of utilities, comprising

- a communication interface (CIM) for transmitting data concerning the measured consumption of utilities to a concentrator (C);

- a host controller (MCM) and a program memory (PM1, PM2), said host controller being arranged to execute programs stored in said program memory relating to the measuring of the consumption of said utilities and the administration of the remote meter (RM);
- wherein said remote meter (RM) is adapted to receive program data transmitted in the form of program data messages each comprising a portion of the program data from said concentrator (C) through said communication interface (CIM), and to update at least a portion (PM2) of said programs stored in said program memory in accordance with said received program data.